

CH



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,485	01/07/2002	Kiyoshi Arita	MEIC: 118	3565

7590 08/27/2003

PARKHURST & WENDEL, L.L.P.  
Suite 210  
1421 Prince Street  
Alexandria, VA 22314-2805

EXAMINER

GEYER, SCOTT B

ART UNIT PAPER NUMBER

2829

DATE MAILED: 08/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/036,485

Applicant(s)

ARITA ET AL.

Examiner

Scott B. Geyer

Art Unit

2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 21, 2003 has been entered.

### ***Claim Objections***

2. Claim 6 as amended is acceptable. Accordingly, the objection of claim 6 from paper no. 8 is withdrawn.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1 and 2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4A. As to claim 1, the applicant recites "...a surface of the object being etched by *blowing the plasma-generating gas onto the object...*". It is unclear to the examiner

Art Unit: 2829

as to what 'blowing the gas onto' means, especially without any details defining blowing, in terms of speed, direction, vector analysis, etc. For a plasma gas to etch an object, the plasma gas must necessarily come into contact with that object, and thus it necessarily follows that the plasma gas is circulating throughout the reaction chamber and onto the object, especially considering that the plasma generating gas is being introduced into the chamber at a certain sccm rate through an inlet port. Therefore, for purposes of examination, the examiner will assume that any plasma generating gas introduced into a reaction chamber through an inlet port is necessarily being 'blown' against the object that is to be etched.

4B. As to claim 2, the claim recites an ejection hole "opposite" to the mounting unit. Without any point of reference in the claim to describe the positional meaning of "opposite", the examiner will assume any two objects or positions to be opposite of each other.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 2, 3, 6 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Cohen et al. (6,110,836).

6A. As to **claim 1**, Cohen et al. teach a plasma method for etching an object, wherein the plasma is composed of a halogen-containing etchant gas and a carrier gas (see column 3, lines 17-23 and also lines 57 et seq.). Cohen et al. further teach sulfur hexafluoride as one of several halogen-containing gases and helium as a carrier gas. The object to be etched is a substrate 54 as shown in figure 1 which is mounted on a support 42 within the chamber 40. The gases are introduced to the chamber via a gas inlet 76. The plasma is generated with a RF power source 74. Cohen et al. also teach the gas mixture as containing less halogen-containing gas than carrier gas (column 4, lines 12-22). The object is etched by the plasma, wherein the plasma gas is blown against the object, which causes reactant products (see column 3, lines 57-67, continued to column 4, lines 1-11), and the reactant products are removed from the surface of the object (see column 1, lines 59-67, continued to column 2, lines 1-12). As to the limitation of “simultaneously” on line 14: the claim recites “removing said at least one reaction product from a surface of the object being etched by blowing the plasma-generating gas onto the object simultaneously while etching the object” on lines 12-15. The claim language as currently recited is redundant. The action described by the words underlined before the word “simultaneous” is the same as that underlined after the word “simultaneous”. In other words, “removing a reaction product from a surface of an object being etched by blowing a plasma gas onto that object” is just another way of stating “etching the object”. Therefore, Cohen et al. teach removing a reaction product from a surface of the object being etched since the plasma-generating gas is being

blown against the object and causing the reaction products to be removed from that object.

6B. As to **claim 2**, Cohen et al. teach a high-frequency voltage applied to the substrate support (mounting unit) (see column 3, lines 24-39). The plasma gas is applied through a gas inlet 76 which is opposite the mounting unit as shown in figure 1.

6C. As to **claim 3**, Cohen et al. teach etching a substrate 54, which clearly has a first and second side, within the plasma etching chamber as shown in figure 1. Cohen et al. also teach, in the background of their invention, plasma etching as related to silicon wafers (see column 1, lines 10 et seq.). As to the language of claim 3, lines 3-7, specifically "and the second side includes a damaged-layer...causing removal of the damaged-layer", applicant should note that this is merely "intended use" language which cannot be relied upon to define over Cohen et al., since Cohen et al. discloses all of the claimed steps and their recited relationships. Specifically, Cohen et al. teach mounting a wafer in a chamber and etching the wafer, whereby the etching step removes material from the surface of the wafer.

6D. As to **claim 6**, Cohen et al. teach in column 4, lines 15 et seq., as an example, that the relative amount of halogen-containing gas is below about 20%. Assuming 20% for this example, then the halogen-containing gas to carrier gas ration is below about 20%:80%, or 1:4. Therefore, Cohen et al. teach the recited range of claim 6, since a ratio below about 1:4 of halogen-containing gas-to-carrier gas (as stated in column 4) is well within the range of 1:>1 to 1:10 (see also paragraph 2 above).

6E. As to **claim 7**, Cohen et al. teach the plasma generating gas as a mixture of a carrier gas and a halogen-containing gas. In the plasma region of the chamber, the halogen-containing gas "breaks up into lightweight ions and radicals which react rapidly with native oxides. The helium atoms also ionize in the plasma...". Therefore, both the halogen-containing gas and the helium are part of the same plasma generating gas, which is used to etch the object. As to the limitation of claim 7, lines 3-5, applicant is directed to the sections 4A and 6A above.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen et al. (6,110,836) as applied to claim 3 above, and further in view of Yoshida et al. (5,575,887).

8A. As to **claim 4**, Cohen et al. do not teach a protective sheet affixed to a first side of a wafer wherein etching the object includes the sub-step of etching the wafer with the protective sheet mounted to the mounting unit. However, Yoshida et al. teach a plasma etching method for etching a wafer substrate 6, as shown in figure 1. One side of the wafer substrate has transistor components and is coated with an insulating film (protective sheet) 61 (column 3, lines 57 et seq.). The surface of the wafer opposite the

Art Unit: 2829

side with circuitry, which is the surface to be etched by the plasma, is open to the plasma gas as shown in the plasma chamber in figure 1. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Cohen et al. with a protective sheet as taught by Yoshida et al. so as to protect the delicate electrical circuitry of the wafer during the etching process.

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen et al. (6,110,836) and Yoshida et al. (5,575,887) as applied to claim 4 above, and further in view of Blalock et al. (6,413,875 B1).

9A. As to **claim 5**, neither Cohen et al. nor Yoshida et al. teach cooling of the mounting unit during the etching process. However, Blalock et al. teach actively cooling the entire chamber during the etching process, which would thus also cool the mounting unit, by flowing inert gas into the chamber (column 3, lines 17-23). At the time of the invention, it would have been obvious to modify the method of Cohen et al. and Yoshida et al. to include a cooling step as taught by Blalock et al. so as to control and maintain etch selectivity.

### ***Response to Arguments***

10. Applicant's arguments filed 7-21-03 have been fully considered but they are not persuasive.

10A. For claim 1: as to the argument that Cohen et al. does not teach a timing relationship, this newly added limitation has been addressed in the amended rejection



for claim 1 above. Furthermore, the applicant argues on page 8, line 7, that Cohen does not describe any timing relationship between etching the object and removing the reaction product from the chamber. Removal of the reaction product from the reaction chamber is not claimed in claim 1; nevertheless, claim 1 as amended is fully addressed by the rejection above.

10B. For claim 7: as to the argument that Cohen et al. does not describe using helium for removal purposes; helium is part of the plasma gas used to etch the object as stated in Cohen et al. on column 3, lines 57-67, continuing to column 4, lines 1-30. Since helium is part of the plasma gas used to etch the object, then it necessarily follows that Cohen et al. does teach helium used for removal purposes, and this has been stated in the rejection of claim 7 above.

10C. The applicant has not made any specific arguments for claims 2, 3 or 6.

10D. For claims 4 and 5: the applicant argues that the prior art references used to reject claims 4 and 5. However, the applicant has merely stated that the prior art references do not provide for the deficiencies of Cohen et al. Without any specific technical arguments against the cited references, this argument is baseless.

### ***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott B. Geyer whose telephone number is (703) 306-5866. The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. E-mail: [scott.geyer@uspto.gov](mailto:scott.geyer@uspto.gov)

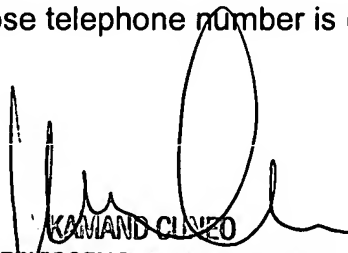
Art Unit: 2829

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (703) 308-1233. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

S.B.G.

SBG  
August 22, 2003



KAMAND CUNEO  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800